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CFD analysis of cd nozzle and effect of nozzle pressure ratio on pressure and velocity for suddenly expanded flows (Article)

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Abstract

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A numerical work was carried out to study the effectiveness of micro-jets to control base pressure in suddenly expanded two-dimensional planar duct. Two micro-jets of 1 mm orifice diameter located at 90° intervals along a pitch circle distance of 1.5 times the nozzle exit diameter in the base region were employed as active controls. The calibrated Mach numbers at the entry to suddenly expanded duct was 1.87. The length-to-diameter ratio (L/D) of suddenly expanded duct was 10. Nozzles generating the calibrated Mach numbers were operated with nozzle pressure ratio (NPR) 3, 5, 7, 9 and 11. From the present investigation it is evident that for a given Mach number and effect of NPR will result in maximum increase/decrease of pressure and velocity. The convergent-divergent nozzle geometry has been modelled and simulated employing turbulence models: K-ε standard wall function turbulence model from the code was independently checked with the commercial computational fluid dynamics. © TJPRC Pvt. Ltd.

Author keywords

ANSYS C-D nozzle CFD Mach number Pressure

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